What is Claimed is:

1. An interpolator which interpolates a digital input signal sequence ($x(k)$) at interpolation instants ($\Delta t/T_{r1}$) prescribed by a control signal (S) for the purpose of generating a digital output signal sequence ($y(k)$), comprising:

a first half band filter, which interpolates the input signal sequence ($x(k)$) in each case in a center of each sampling period (T_{r1}) of the input signal sequence ($x(k)$) and thus generates an intermediate signal sequence ($z(k)$);

a first polyphase filter, which interpolates the intermediate signal sequence ($z(k)$) at an instant (t_L) which lies in a predetermined pattern of possible interpolation instants before the interpolation instant ($\Delta t/T_{r1}$) prescribed by the control signal(S);

a second polyphase filter, which interpolates the intermediate signal sequence ($z(k)$) at an instant (t_R) which lies in a predetermined pattern of possible interpolation instants after the interpolation instant ($\Delta t/T_{r1}$) prescribed by the control signal (S); and

a linear interpolation filter, which carries out a linear interpolation between interpolation values ($y_{PPF\_L}(k)$, $y_{PPF\_R}(k)$) of the first and second polyphase filters in a manner dependent on a position of the interpolation instant ($\Delta t/T_{r1}$) prescribed by the control signal (S) relative to the interpolation instants (t_L, t_R) of the first and second polyphase filters.

2. The interpolator as claimed in claim 1, wherein at least one second half band filter is connected upstream of the first half band filter, and performs band limiting to a frequency range in which a transfer function ($H_2(f)$) of the first half band filter is approximately constant.

3. The interpolator as claimed in claim 1, wherein the polyphase filters in each case have a series of a plurality of serially arranged delay elements and a plurality of multipliers, whose first input can be connected via in each case an assigned changeover device to an input or to an output of an assigned delay element.

4. The interpolator as claimed in claim 1, wherein the polyphase filters in each case have a first series of a plurality of serially arranged delay elements, to which odd-numbered values (z(2k+1)) of the intermediate signal sequence are fed, a second series of a plurality of serially arranged delay elements, to which even-numbered values (z(2k)) of the intermediate signal sequence are fed, and a plurality of multipliers, whose first input can be connected via in each case an assigned changeover device to a delay element of one of the first series and the second series.

5. The interpolator as claimed in claim 3, wherein a second input of the multipliers is connected to a coefficient memory, which, in a manner dependent on the control signal (S), selects a coefficient (a; b; c; d) associated with the interpolation instant (t_L; t_R) for a respective changeover device.

6. An interpolation method for generating a digital output signal sequence (y(k)) by interpolation of a digital input signal sequence (x(k)) at interpolation instants (Δ)t/T_{r1}) prescribed by a control signal (S), comprising:

interpolating the input signal sequence (x(k)) in each case in a center of each sampling period (T_{r1})

of the input signal sequence $(x(k))$, and thus generating an intermediate signal sequence $(z(k))$;

interpolating the intermediate signal sequence $(z(k))$ in a first polyphase filter at a first instant (t_L), which lies in a predetermined pattern of possible interpolation instants before the interpolation instant $(\Delta)t/T_{r1})$ prescribed by the control signal (S), and thus generating in each case a first interpolation value $(y_{PPF\_L}(k))$;

interpolating the intermediate signal sequence $(z(k))$ in a second polyphase filter at a second instant (t_R), which lies in a predetermined pattern of possible interpolation instants after the interpolation instant $(\Delta)t/T_{r1})$ prescribed by the control signal (S), and thus generating a second interpolation value $(y_{PPF\_R}(k))$; and

linear interpolating the first and second interpolation values $(y_{PPF\_L}(k))$, $y_{PPF\_R}(k))$, in a manner dependent on the position of the interpolation instant $(\Delta)t/T_{r1})$ prescribed by the control signal (S) relative to the first and second instants (t_L, t_R).

7. The interpolation method as claimed in claim 6, wherein in the case where the second instant (t_R) coincides with a sampling instant of the intermediate signal sequence $(z(k))$, the interpolation for generating the second interpolation value $(y_{PPF\_R}(k))$ is effected on the basis of an intermediate signal sequence $(z(k+1))$ shifted by a sampling period (T_{r2}).

8. The interpolator as claimed in claim 2, wherein the polyphase filters in each case have a series of a plurality of serially arranged delay elements and a plurality of multipliers, whose first input can be connected via in each case an assigned changeover device to an input or to an output of an assigned delay element.

9. The interpolator as claimed in claim 2, wherein the polyphase filters in each case have a first series of a plurality of serially arranged delay elements, to which odd-numbered values (z(2k+1)) of the intermediate signal sequence are fed, a second series of a plurality of serially arranged delay elements, to which even-numbered values (z(2k)) of the intermediate signal sequence are fed, and a plurality of multipliers, whose first input can be connected via in each case an assigned changeover device to a delay element of one of the first series and the second series.

5. The interpolator as claimed in claim 4, wherein a second input of the multipliers is connected to a coefficient memory, which, in a manner dependent on the control signal (S), selects a coefficient (a; b; c; d) associated with the interpolation instant (t_L; t_R) for a respective changeover device.